PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

United States Patent and Trademark Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 28 January 1999 (28.01.99)	
International application No. PCT/US98/12502	**Applicant's or agent's file reference** RCA 88670
International filing date (day/month/year) 16 June 1998 (16.06.98)	**Priority date** (day/month/year) 16 June 1997 (16.06.97)
Applicant XIE, Jianlei	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

21 December 1998 (21.12.98)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Nicola Wolff
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
RCA 88670		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US98/12502	16/06/1998	16/06/1997
International Patent Classification (IPC) or national classification and IPC G11B7/00		
Applicant THOMSON CONSUMER ELECTRONICS, INC. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 11 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
21/12/1998	28.09.99
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Holubov, C Telephone No. +31 70 340 2923

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/US98/12502

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1-4,7-16	as originally filed			
5,6,6a	as received on	21/07/1999	with letter of	19/07/1999

Claims, No.:

1-19	as originally filed			
20-23	as received on	21/07/1999	with letter of	19/07/1999

Drawings, sheets:

1/11-11/11	as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

3. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

see separate sheet

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-23
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-23
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 1-23
	No:	Claims

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item 1
Basis of the Report

The amendments filed with the letter dated 19 July 1999 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The amendments concern the following omissions:
1) Claim 21 does not state or imply that the identification data is laser encoded.
2) Claim 22 does not state or imply that the first and second codes are laser encoded or that the first and second code identifies the first and second main data, respectively.
3) Claim 23 does not state or imply that the first and second codes are laser encoded.
The aspect of identification information appears to be essential in light of the technical problem to be solved (pages 3-5 application). The aspect of laser encoded is also essential, when account is taken of information which would be inferred by the skilled man - namely, that the BCA area of a DVD, which is written by laser during post-stamping production (page 4 application), provides an advantage (increased protection against tampering) that identification information encoded another way would not necessarily have, and this advantage appears to be essential in light of the technical problem to be solved.

Claims 21-23 also lack clarity (see Item VIII).

The claims have been therefore been interpreted as follows:

Claim 21
An optical disk having a first recording area where first main data are recorded in the form of pits, and a second recording area which is a predetermined area in the first recording area, where a plurality of stripes of a reflection film have been removed by a laser, such that first identification data is recorded in association with the first main data, the optical disk being characterized by a third recording area for recording second main data, and a fourth recording area where a plurality of stripes of a reflection film have been removed by a laser, such that second identification data is recorded in association with the second main data.

Claim 22
A method for processing a disk comprising the steps of obtaining from the disk a first individualized laser-encoded code on a first area of the disk and using the first code

obtained to identify first main data associated with the first code, the method further characterized by obtaining from the disk a second individualized laser-encoded code on a second area of the disk and using the second code obtained to identify second main data associated with the second code.

Claim 23

A method of forming a disk comprising the steps of encoding first main data on a first area of the disk and laser encoding an individualized first code on a second area of the disk for identifying the first main data, the method further characterized by encoding second main data on a third area of the disk and laser encoding an individualized second code on a fourth area of the disk for identifying the second main data.

Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:
D1: EP 0 802 527 published 22.10.97 (after the priority date of this application), which is a translation of WO 97 14144 published 17.04.97 (before the priority date of this application)

Claim 1-5

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):
A recording medium (801) having a first and a second side (809a, 809b, column 3 lines 23-29) comprising program data (column 6) on said first and said second sides of said medium and an area on a side of said medium having laser encoded data (BCA, column 3, Figures 1-3) representing information.

The subject-matter of claim 1 differs from the prior art in that both first and second sides of the media have laser encoded data, and this data identifies the program data on the sides of the medium.

The effect of this is that the laser-encoded data identify the individual programs on the disk, not just the disk itself, so that, for example, a provider of a pay-per-view service can uniquely identify, and charge for, different movies on a DVD disk.
The recording medium of D1 also gives a provider the capability of allowing the use of only part of the contents, but it does so by using separate cipher keys for the various contents.
The subject-matter of claim 1 is therefore an alternative way of allowing access to part of the contents of a recording medium with first and second sides.
There is no indication in D1 to provide laser-encoded data on both sides of the medium to identify the program data.

Since claim 1 satisfies the requirements of Article 33(1)-(3) PCT, claims 2-5 which depend on claim 1 also satisfy the requirements.

Claim 6-13

The document D1 is regarded as being the closest prior art to the subject-matter of claim 6, and shows:

A recording medium (800) comprising a first (800a) and a second layer (800b), each of said layers containing respective program data (column 6), and an area on a layer having laser encoded data representing individualizable information (BCA, column 3, Figures 1-3).

The subject-matter of claim 6 differs from the prior art in that both first and second layers of the medium have laser encoded data, and this data identifies the program data on the layers of the medium. The indications of the effect of the difference and the reason for the lack of obviousness given above for claim 1 apply mutatis mutandis to claim 6.

Since claim 6 satisfies the requirements of Article 33(1)-(3) PCT, claims 7-13 which depend on claim 6 also satisfy the requirements.

Claim 14

The document D1 is regarded as being the closest prior art to the subject-matter of claim 14, and shows:

A DVD (800) disk comprising first and second layers (800a, 800b) for storing programs (column 6) and an area on a layer having laser-encoded data for identifying the disk (BCA , column 3, Figures 1-3).

The subject-matter of claim 14 differs from the prior art in that both first and second layers of the DVD have laser encoded data, and this data identifies the program data on the first and second layers of the DVD.

The indications of the effect of the difference and the reason for the lack of obviousness given above for claim 1 apply mutatis mutandis to claim 14.

Claim 15-18

The document D1 is regarded as being the closest prior art to the subject-matter of claim 15, and shows:

An apparatus (Figure 1) for laser encoding a distinctive code (920, BCA) on a recording medium (801) comprising means (921, 922, 923, 806, 923a, 807a, 807b) for encoding said code in a preselected position and in a preselected layer on said recording medium.

The subject-matter of claim 15 differs from the prior art in that it has means for encoding a first and a second code in a preselected position and a preselected layer of the recording medium. The indications of the effect of the difference and the reason for the lack of obviousness given above for claim 1 apply mutatis mutandis to claim 15. Since claim 15 satisfies the requirements of Article 33(1)-(3) PCT, claims 16-18 which depend on claim 15 also satisfy the requirements.

Claims 19,20

The document D1 is regarded as being the closest prior art to the subject-matter of claim 19, and shows:
A method for processing (columns 3,4, Figures 2,3) a disk (801) have one laser encoded data (BCA) for identifying said disk.
The subject-matter of claim 19 differs from the prior art in that it has means to identify more than one laser encoded data for identifying more than one program on the disk. The indications of the effect of the difference and the reason for the lack of obviousness given above for claim 1 apply mutatis mutandis to claim 19.
Since claim 19 satisfies the requirements of Article 33(1)-(3) PCT, claim 20 which depends on claim 19 also satisfy the requirements.

Claim 21

The document D1 is regarded as being the closest prior art to the subject-matter of claim 21, and shows:
An optical disk (801) having a first recording area where first main data are recorded in the form of pits, and a second recording area which is a predetermined area in the first recording area, where a plurality of stripes of a reflection film have been removed by a laser, such that first identification data (921, column 3 line 30) is recorded in association with the first main data (columns 3,4).
The subject-matter of claim 21 differs from the prior art in that it has a third recording area for recording second main data, and a fourth recording area where a plurality of stripes of a reflection film have been removed by a laser, such that second identification data is recorded in association with the second main data. The indications of the effect of the difference and the reason for the lack of obviousness given above for claim 1 apply mutatis mutandis to claim 21.

Claim 22

The document D1 is regarded as being the closest prior art to the subject-matter of claim 22, and shows:

A method for processing (columns 3-8) a disk (801) comprising the steps of obtaining from the disk a first individualized laser-encoded code on a first area of the disk and using the first code obtained to identify first main data associated with the first code (Figures 2,3).

The subject-matter of claim 22 differs from the prior art in that it also comprises the steps of obtaining from the disk a second individualized laser-encoded code on a second area of the disk and using the second code obtained to identify second main data associated with the second code. The indications of the effect of the difference and the reason for the lack of obviousness given above for claim 1 apply mutatis mutandis to claim 22.

Claim 23

The document D1 is regarded as being the closest prior art to the subject-matter of claim 23, and shows:

A method of forming a disk (801) comprising the steps of encoding first main data on a first area of the disk and laser encoding an individualized first code on a second area of the disk for identifying the first main data (Figure 1, column 3 lines 16-38).

The subject-matter of claim 23 differs from the prior art in that it also comprises the steps of encoding second main data on a third area of the disk and laser encoding an individualized second code on a fourth area of the disk for identifying the second main data.. The indications of the effect of the difference and the reason for the lack of obviousness given above for claim 1 apply mutatis mutandis to claim 23.

Re Item VII

Certain defects in the international application

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not correctly indicated in the description. In particular, contrary to the statement on page 5 lines 10 and 11 of the application document D1 does dislose that the optical disc may have different sides (column 3 lines 23-29 disclose combining two single-sided disks into one disc i.e. a double-sided disc) or different layers (column 4 lines 3-5).

Independent claims 1,6 ,14 and 15 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1, see Section V) being placed in a preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).
In the present case, the following features are known in combination from the document D1 and belong in the preamble of the appropriate claims:
Claim 1: A recording medium having a first and a second side comprising respective program data on said first and said second sides of said medium.
Claim 6: A recording medium having a first and a second layer, each of said layers containing respective program data.
Claim 14: A DVD disk comprising first and second layers for storing programs.
Claim 15: An apparatus for laser encoding a selectively distinctive code on a recording medium.

The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Re Item VIII

Certain observations on the international application

In claim 21 the phrase "a plurality of a reflection film are removed partially" is unclear. On the basis of the description, this has been understood to mean "a plurality of stripes of a reflection are removed by a laser.

In claim 22 the phrase "a ...code encoded individually " is unclear. On the basis of the description, this has been understood to mean "an individualized ... code". Similarly, in claim 22 the phrase "encoding individually a ... code" in unclear, and has been understood to mean "encoding an individualized ... code".

The vague and imprecise statement in the description on page 16 line 14 (". . .spirit of the invention") implies that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them (see also the PCT Guidelines III, 4.3a).

DVD Specifications is described, for example, in an article entitled "BCA Recording Technology for Adding Individual Information on DVD ROM Disk",published in National Technical Report of Japan, Vol. 43, No. 3, dated June, 1997. The system employs a CW-Q switch type YGA laser with wavelength of 1.06 um to encode data in a BCA area.

Similarly, D1, EP 0 802 527 A1, discloses an optical disk having a first recording area and a BCA area encoded with identification data. The data in the BCA is used to decipher data recorded on the first encoding area. Nowhere in D1, however, suggests that the optical disk may have different sides or layers or that more than one BCA area may be used on the disk.

In summary, current DVD Specifications as well as the above mentioned article and D1, do not teach or suggest that multiple BCA areas may be included on a single disk, or that a BCA may be applied to a dual-sided disk, or that each layer or each side of a recording medium may have a unique BCA.

SUMMARY OF INVENTION

The present inventor recognizes that it is desirable to be able to provide multiple laser-encoded area on a single disk. In particular, it is desirable to provide a respective laser-encoded area having selectively distinctive information for each side and/or each layer of a recording medium such as a laser disk. This would greatly expand the capability of a program distributor to be able to uniquely identify the contents of a disk. This would allow, for example, a pay-per-view provider to be able to distribute different movies encoded on different layers and/or different sides of a disk, instead of being limited to having only one BCA for the whole entire disk, as specified in the current DVD Specifications. This would greatly reduce the cost of program distribution.

Another aspect of the present invention is the recognition by the present inventor that the laser cutting process employed to remove the aluminum reflective surface to form a BCA may cause potential defects if more than one BCAs are used on a disk and the different BCAs overlap each other. This potential problem is illustrated in Figs. 3A and 3B. Fig. 3A illustrates the process for removing a portion of reflective layer 1 for encoding individualizable information in a BCA. This is done, for example, by focusing a YGA laser on the reflective layer 1 of the disk, as shown in FIG. 3A. The portion of the reflective layer 1 is then melted and the melted aluminum is then pulled away by surface tension leaving a non-metal portion 301, as shown in Fig. 3A.

Fig. 2B illustrates that when there is a problem with the laser cutting process, some portion of the laser energy may be absorbed unintentionally by another overlapping metal layer, for example, layer 0 of the recording medium, appearing below layer 1. This may cause the data of the BCA contained in the overlapping layer 0 of the disk to be corrupted. A defect of this kind will render the associated user program on layer 0 of the disk useless.

Therefore, a recording medium according to the present invention is disclosed, having a first and a second side comprising:

respective program data on said first and said second sides of said medium; and

a first area on said first side and a second area on said second side of said medium, said areas having laser encoded data representing individualizable information relating to said respective program data.

In one aspect of the present invention, the first and the second area described above do not overlap each other.

In addition, an apparatus for encoding a first and a second selectively distinctive codes on a recording medium is disclosed, comprising:

means for encoding said first code in a first preselected position and in a first preselected layer on a first side of said recording medium;

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20. The method of claim 19, wherein said laser encoding areas are Burst Cutting Areas for a DVD disk.

21. An optical disk having a first recording area where first main data are recorded in the form of pits, and a second recording area which is a predetermined area in the first recording area, where a plurality of a reflection film are removed partially, so a first identification data is recorded for associating with the first main data, the optical disk being characterized by:

a third recording area for recording second main data; and

a forth recording area where a plurality of reflection film are removed partially, so a second identification data is recorded for associating with the second main data.

22. A method for processing a disk, comprising the steps of obtaining, from the disk, a first code encoded individually on a first area of the disk; and using the first code obtained to process first main data associated with the first code, the method further characterized by:

obtaining, from the disk, a second code encoded individually on a second area of the disk; and

using the second code obtained to process second data associated with the second code.

23. A method for forming a disk, comprising the steps of encoding first main data on a first area of the disk; and encoding, individually, a first code on a second area of the disk for identifying the first main data, the method further characterized by:

encoding second main data on a third area of the disk; and

encoding, individually, a second code on a forth area of the disk for identifying the second main data.

DVD Specifications is described, for example, in an article entitled "BCA Recording Technology for Adding Individual Information on DVD ROM Disk", published in National Technical Report of Japan, Vol. 43, No. 3, dated June, 1997. The system employs a CW-Q switch type YGA laser with wavelength of 1.06 um to encode data in a BCA area.

Current DVD Specifications as well as the above mentioned article do not teach or suggest that multiple BCA areas may be included on a single disk, or that a BCA may be applied to a dual-sided disk, or that each layer or each side of a recording medium may have a unique BCA.

SUMMARY OF INVENTION

The present inventor recognizes that it is desirable to be able to provide multiple laser-encoded area on a single disk. In particular, it is desirable to provide a respective laser-encoded area having selectively distinctive information for each side and/or each layer of a recording medium such as a laser disk. This would greatly expand the capability of a program distributor to be able to uniquely identify the contents of a disk. This would allow, for example, a pay-per-view provider to be able to distribute different movies encoded on different layers and/or different sides of a disk, instead of being limited to having only one BCA for the whole entire disk, as specified in the current DVD Specifications. This would greatly reduce the cost of program distribution.

Another aspect of the present invention is the recognition by the present inventor that the laser cutting process employed to remove the aluminum reflective surface to form a BCA may cause potential defects if more than one BCAs are used on a disk and the different BCAs overlap each other. This potential problem is

illustrated in Figs. 3A and 3B. Fig. 3A illustrates the process for removing a portion of reflective layer 1 for encoding individualizable information in a BCA. This is done, for example, by focusing a YGA laser on the reflective layer 1 of the disk, as shown in FIG. 3A. The portion of the reflective layer 1 is then melted and the melted aluminum is then pulled away by surface tension leaving a non-metal portion 301, as shown in Fig. 3A.

Fig. 2B illustrates that when there is a problem with the laser cutting process, some portion of the laser energy may be absorbed unintentionally by another overlapping metal layer, for example, layer 0 of the recording medium, appearing below layer 1. This may cause the data of the BCA contained in the overlapping layer 0 of the disk to be corrupted. A defect of this kind will render the associated user program on layer 0 of the disk useless.

Therefore, a recording medium according to the present invention is disclosed, having a first and a second side comprising:

respective program data on said first and said second sides of said medium; and

a first area on said first side and a second area on said second side of said medium, said areas having laser encoded data representing individualizable information relating to said respective program data.

In one aspect of the present invention, the first and the second area described above do not overlap each other.

In addition, an apparatus for encoding a first and a second selectively distinctive codes on a recording medium is disclosed, comprising:

means for encoding said first code in a first preselected position and in a first preselected layer on a first side of said recording medium;

20. The method of claim 19, wherein said laser encoding areas are Burst Cutting Areas for a DVD disk.

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

TRIPOLI, J.
GE & RCA Licensing Management
Operation, Inc.
P.O. Box 5312
Princeton, New Jersey 08543
ETATS-UNIS D'AMERIQUE

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	28.09.99
Applicant's or agent's file reference: RCA 88670	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US98/12502	16/06/1998	16/06/1997

Applicant
THOMSON CONSUMER ELECTRONICS, INC. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Kruydenberg, G Tel.+31 70 340-2277

Form PCT/IPEA/416 (July 1992)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
RCA 88670		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US 98/ 12502	16/06/1998	16/06/1997
Applicant		
THOMSON CONSUMER ELECTRONICS, INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. [ ] **Certain claims were found unsearchable** (see Box I).

2. [ ] **Unity of invention is lacking** (see Box II).

3. [ ] The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing
   - [ ] filed with the international application.
   - [ ] furnished by the applicant separately from the international application,
     - [ ] but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
   - [ ] Transcribed by this Authority

4. With regard to the **title,**
   - [X] the text is approved as submitted by the applicant
   - [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   - [X] the text is approved as submitted by the applicant
   - [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:
   Figure No. 4A
   - [X] as suggested by the applicant.
   - [ ] because the applicant failed to suggest a figure.
   - [ ] because this figure better characterizes the invention.
   - [ ] None of the figures.

PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : G11B 7/00, 7/007, 27/26

A1

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(30) Priority Data:
60/049,653 16 June 1997 (16.06.97) US

(71) Applicant *(for all designated States except US)*: THOMSON CONSUMER ELECTRONICS, INC. [US/US]; 10330 North Meridian Street, Indianapolis, IN 46290–1024 (US).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: XIE, Jianlei [CN/US]; 11852 Stoney Bay Circle, Carmel, IN 46033 (US).

(74) Agents: TRIPOLI, Joseph, S. et al.; GE & RCA Licensing Management Operation, Inc., P.O. Box 5312, Princeton, NJ 08543 (US).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
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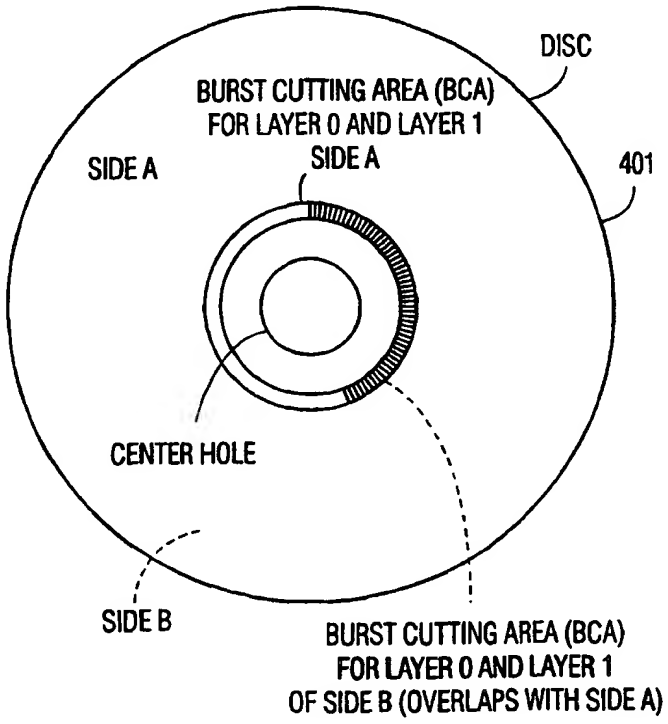
(54) Title: IDENTIFICATION OF PROGRAM INFORMATION ON A RECORDING MEDIUM

(57) Abstract

A system and method of identifying programs contained on a disk of any format, including, for example, either a single–sided or a double–sided disk with either a single–layer or multi–layer tracks, are presented. In particular, a dual–sided recording medium is disclosed having respective program data on the first and the second sides of said medium. In addition, the medium has a first area on the first side and a second area on the second side, and the areas have laser encoded data representing individualizable information relating to said respective program data. The areas may or may not overlap each other depending on the configuration chosen. Also disclosed is an apparatus for laser encoding the above–described recording medium, and a method for processing a disk having more than one laser encoded areas.



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IDENTIFICATION OF PROGRAM INFORMATION ON A RECORDING MEDIUM

FIELD OF INVENTION

This invention generally relates to the field of encoding information on a recording medium, and more particularly to a system and method of identifying a disk with any format, including, for example, either a single-sided or a double-sided format with either a single-layer or multiple-layer tracks.

BACKGROUND OF INVENTION

Laser disks such as CD ROMs have become the preferred recording medium for audio music and/or computer program distribution. More recently, Digital Video/Versatile Disks (DVD) have been introduced that are predicted to become the preferred choice for recording everything from full-length motion pictures to computer games.

One advantage of a DVD over CD ROM is DVD's superior data storage capacity. The current industry-wide DVD Specifications for Read-Only Disk (published by and obtainable from Toshiba Corporation of Tokyo, Japan; here in after referred to as "DVD Specifications") support at least the following formats (listed with the corresponding storage capacities for a 12 cm DVD ROM disk):

Format	Capacity
Single sided	4.7 GBytes
Double sided	9.4 GBytes
Single sided, dual layered	8.54 GBytes
Double sided, dual layered	17 Gbytes

From the above, it is clear that the storage capacities of DVD disks improve dramatically over the storage capacity of .65 GByte available on the current CD-ROM. In addition, other optical disks with more than 4 layers of tracks are also being produced.

A laser or an optical disk such as a DVD disk is made up of a reflective metal foil layer such as aluminum encased in a clear substrate. Data are stored on the foil as a series of tiny pits formed in a continuos tight spiral on the disk. The pits are formed in the foil by first stamping a disk made of polycarbonate, acrylic, polyolefine or similar material, using a master stamper in a pressing or injection molding process. The surface of the injection molded disk is then metalized with, for example, aluminum metal in a sputtering process to form the metal foil containing the pits. The pits provide the necessary reflective surface so that a laser beam from a DVD player may be reflected to indicate the data pattern on the disc.

As mention above, there are at least 4 different formats currently contemplated for DVD. In the case of a single-sided DVD, the stamped disk is joined to a dummy substrate. For a double-sided disk, two halves, each with a respective metal foil layer containing data, are bonded back to back.

In addition, as defined by the DVD Specifications, two layers of data are possible on each side of a disk. A single-layer disk has only one track per side on a disk, whereas a dual-layer disk has two tracks per side of a disk. A dual-layer disk has both a Layer 0 track closer to the reading surface, and a Layer 1 track, away from the reading surface, as shown, for example, in Fig. 1A. Typically, a dual-focus optical system is employed so that the data on either Layer 0 or Layer 1 on a

dual-layer disk can be read. Layer 0 is purposely made partially transparent so that a laser in the optical system can focus on Layer 1 through Layer 0.

Fig. 1B shows the disk structure of a known double-sided, dual-layer disk. The exemplary disk has a total of 4 reflective layers (two on each side of the disk). To read a dual-sided disk, a user either manually flips over the disk or the DVD player use a motor mechanism to automatically flip the disk or the laser.

Since all the laser disks from a single manufacturing run are stamped from the same stamping master, their contents are identical to each other and to the stamping master. It has been recognized that it may be desirable to be able to put certain data (e.g., serial number or encryption key, etc.) unique to each disk or program on the disk so that the disk or the program contained within can be identified. This would allow, for example, a company to be able to offer pay-per-view capability, to prevent piracy, or to remotely activate a computer program.

For example, to offer a pay-per-view service using a DVD disk, a company may decide to give out DVD disks containing a movie program at very low cost and then to charge viewers based on the number of times the movie is played. This pay-per-view application can be accomplished, for example, by having an individualized serial number associated with each individual disk or program being distributed. A DVD player can be built that can interrogate and retrieve this serial number, if the disk is played by the player. This serial number can then be transmitted to the program provider's billing center via a built-in modem, for example, in the DVD player, so that a charge can be billed to the household where the DVD player resides.

In order to support this type of application, the current DVD Specifications define an area on a DVD disk that allows a manufacturer to etch, by a laser, information onto each disk during the post-stamping production. (See, for example, DVD Specifications for Read Only Disk/Part 1, Physical Specification Version 1.0, Annex K).

This "Burst Cutting Area" (BCA) is specified to be located between an inner circumference of 22.3 (+0/-.4) mm to an outer circumference of 23.50 (+/- .05) mm from the center of the center hole of a disk, as shown in Fig. 2. BCA is specified in the DVD Specifications only for a single-sided disk, either with single or dual layers. For a dual-layer disk, the DVD Specifications require that the BCA to be on layer 1 of the single-sided disk.

According to the information to be encoded, stripes in a bar-code like shape are formed by partially removing an aluminum reflective layer of a disk using a converged laser beam. When the stripped part of the BCA is reproduced with an optical laser, the amount of reflected light drops to near zero. When compared to normal program pit signal, the BCA signal level is larger in amplitude and longer in cycle. Therefore, the BCA signal is easily distinguished from a DVD program signal by passing the signal through a simple low-pass filter.

A maximum of 2000 stripes in bar code form may be recorded along the circumference of the disk. Maximum of 188 bytes are currently allowed in the BCA strip, which in the bar-code like encoding reaches a rotational angle of 300 degrees along the circumference of the disk, as shown in Fig. 2.

A laser system capable of encoding individualized information on a disk conforming to the BCA requirement of the

DVD Specifications is described, for example, in an article entitled "BCA Recording Technology for Adding Individual Information on DVD ROM Disk", published in National Technical Report of Japan, Vol. 43, No. 3, dated June, 1997. The system employs a CW-Q switch type YGA laser with wavelength of 1.06 um to encode data in a BCA area.

Current DVD Specifications as well as the above mentioned article do not teach or suggest that multiple BCA areas may be included on a single disk, or that a BCA may be applied to a dual-sided disk, or that each layer or each side of a recording medium may have a unique BCA.

SUMMARY OF INVENTION

The present inventor recognizes that it is desirable to be able to provide multiple laser-encoded area on a single disk. In particular, it is desirable to provide a respective laser-encoded area having selectively distinctive information for each side and/or each layer of a recording medium such as a laser disk. This would greatly expand the capability of a program distributor to be able to uniquely identify the contents of a disk. This would allow, for example, a pay-per-view provider to be able to distribute different movies encoded on different layers and/or different sides of a disk, instead of being limited to having only one BCA for the whole entire disk, as specified in the current DVD Specifications. This would greatly reduce the cost of program distribution.

Another aspect of the present invention is the recognition by the present inventor that the laser cutting process employed to remove the aluminum reflective surface to form a BCA may cause potential defects if more than one BCAs are used on a disk and the different BCAs overlap each other. This potential problem is

illustrated in Figs. 3A and 3B. Fig. 3A illustrates the process for removing a portion of reflective layer 1 for encoding individualizable information in a BCA. This is done, for example, by focusing a YGA laser on the reflective layer 1 of the disk, as shown in FIG. 3A. The portion of the reflective layer 1 is then melted and the melted aluminum is then pulled away by surface tension leaving a non-metal portion 301, as shown in Fig. 3A.

Fig. 2B illustrates that when there is a problem with the laser cutting process, some portion of the laser energy may be absorbed unintentionally by another overlapping metal layer, for example, layer 0 of the recording medium, appearing below layer 1. This may cause the data of the BCA contained in the overlapping layer 0 of the disk to be corrupted. A defect of this kind will render the associated user program on layer 0 of the disk useless.

Therefore, a recording medium according to the present invention is disclosed, having a first and a second side comprising:

respective program data on said first and said second sides of said medium; and

a first area on said first side and a second area on said second side of said medium, said areas having laser encoded data representing individualizable information relating to said respective program data.

In one aspect of the present invention, the first and the second area described above do not overlap each other.

In addition, an apparatus for encoding a first and a second selectively distinctive codes on a recording medium is disclosed, comprising:

means for encoding said first code in a first preselected position and in a first preselected layer on a first side of said recording medium;

means for turning said recording medium to a second side; and

means for encoding said second code in a second preselected position and in a second preselected layer on said second side of said recording medium.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1A shows an exemplary structure of a dual-layer DVD disk.

Fig. 1B shows an exemplary structure of a dual-layer, dual-sided DVD disk.

Figs. 2A shows an illustration of a burst cutting or laser cutting area on a disk.

Fig. 3A shows how a portion of a metal layer is removed to form a burst cutting area.

Fig. 3B shows how damage may occur to another overlapping burst cutting area.

Figs. 4A and 4B show an exemplary disk which has an overlapping burst cutting area for each layer of the disk in accordance with the present invention.

Fig. 5 shows an exemplary disk which has a burst cutting area for each layer of a dual-sided, dual-layer disk, with each burst cutting area occupying a separate non-overlapping area of the disk, in accordance with the present invention.

Fig. 6 shows an exemplary disk which has a burst cutting area for each layer of the 4-layer disk, with each burst cutting area occupying a non-overlapping, concentric circle on the disk in accordance with the present invention.

Fig. 7 shows an exemplary disk which has a burst cutting area for each side of a two-sided disk, with each burst cutting area occupying different, non-overlapping area of the disk.

Fig. 8 shows an exemplary laser cutting apparatus capable of implementing the exemplary disks in accordance with the present invention.

Fig. 9 shows an exemplary control program for controlling the apparatus shown in Fig. 8 in accordance with the present invention.

DETAILED DESCRIPTION OF DRAWING

Fig. 4A shows an exemplary, double-sided, dual-layer disk 401 which has a burst cutting area for each layer of the disk in accordance with the present invention. Each respective BCA area for each layer of the disk may, for example, occupy the same location as currently specified in the DVD Specifications (i.e., with inner circumference of 22.3 (+0/-.4) mm and outer circumference of 23.50 (+/- .05) mm, from the center of the center hole), as shown in Figs. 2A and 4A. The advantage of having the respective BCA for each layer at the same location as currently specified in the DVD Specifications is that no hardware modification is needed for the present DVD player to be able to read the individualized code encoded in the respective BCA area.

As shown in Fig. 4B, the BCA for layer 0 of side A of the disk 401 will be encoded in layer 0 of side A. The BCA for layer 1 of side A will be encoded in layer 1 of side A of the disk 401. Similarly, BCA for layer 0 of side B will be encoded in layer 0 of side B of the disk 401, and BCA for layer 1 of side B will be encoded in layer 1 of side B of the disk 401. Fig. 4B also illustrates how a YGA laser may be positioned and focused (see,

for example, positions (402-405) to encode the individualized codes for each BCA for each layer of the disk 401. The YGA laser may be focused on layer 0 of disk 401 through layer 1 since layer 1 is semi-reflective as discussed above and shown in Fig. 1A.

As discussed above, the present inventor recognizes that it may be desirable to locate a respective BCA for each layer of a recording medium in a non-overlapping manner with respect to each other so that potential defects may be minimized. Fig. 5 shows one such exemplary configuration in accordance with the present invention.

Fig. 5 shows a double-sided, dual-layer disk which also has a BCA for each layer of the disk. Each respective BCA may be positioned, for example, as specified in the DVD Specifications (i.e., located with inner circumference of 22.3 (+0/-.4) mm and outer circumference of 23.50 (+/- .05) mm from the center of the center hole). However, in order for all four BCAs to be non-overlapping with respect to each other, each BCA is allocated to have approximately 1/4 circumference of the specified BCA area, as shown in Fig. 5. Of course, the allocation of one quadrant for each BCA of each layer is exemplary only. The allocation may be done dynamically, for example, depending on the amount of individualized information needed to be encoded for each layer of the disk and the actual number of BCA areas used. Again, the advantage of having the respective BCA fall within the same tolerance as currently specified in the DVD Specifications is that no hardware modification is needed for the present DVD player to be able to read the individualized codes encoded in the respective BCA area.

Another exemplary embodiment of a disk in accordance with the present invention is shown in Fig. 6. Again, the dual-sided, dual-layer disk shown in Fig. 6 has a BCA area for each layer of the disk. The BCA areas shown in Fig. 5 also have non-overlapping positions with respect to each other, thereby minimizing potential defects caused by the laser coding process. Each respective BCA for each layer of the disk in Fig. 6 occupies one of four successive concentric rings. The four concentric rings together form the area defined by the DVD Specifications for BCA (i.e., having inner circumference of 22.3 (+0/-.4) mm and outer circumference of 23.50 (+/- .05) mm from the center of the center hole). Since each BCA is still within the tolerance specified by the DVD Specifications, even though it is thinner, the red laser normally deployed in the DVD player will have no problem reading the codes embedded in each BCA, therefore, requiring little if any change to the current DVD hardware.

Fig. 7 shows another exemplary embodiment of a disk employing a combination of the spatial separation arrangements shown in Figs. 5 and 6. As shown in Fig. 7, a BCA for side A may be located in layer 1 of side A of the disk 701 and occupies a position which has non-overlapping circumferences and/or non-overlapping radius with respect to that of the BCA for side B of the disk 701. BCA for side B of the disk may also be located in layer 1 of the side B of disk 701.

Fig. 8 is an exemplary BCA recording system 800 suitable for encoding individualizable information in multiple configurations as shown, for example, in Figs. 4-7. The system 800 utilizes a CW-Q switch type YAG laser source 801 with wavelength of 1.06 um. The laser source 801 applies a high energy pulse laser beam during a short period of time to

remove an aluminum layer of a disk 805. One pulse of the laser beam can produce one BCA stripe.

The system 800 also includes a line beam forming optical system to shape the laser source into a line beam. The line beam forming system comprising a beam expander 802, cylindrical lens 803, focus lens 804. The functions of these components are well known in the art.

The system also includes a turn table 807 for seating a disk 805 to be encoded. The turn table 807 is controlled by a precision motor 809 which is connected to a rotary signal processor 810. Rotary signal processor 810 receives control signals from the processor controller 811 and in turns sends signals to drive the motor 809.

The system 800 is under the control of the process controller 811. The process controller 811 monitors the overall operation of the system and generates appropriate signals to control the laser source 801, rotary signal processor 810, the line beam forming system comprising of elements 801 - 803, and pick up arm 806, according to an exemplary control program shown in Fig. 9.

Fig. 9 shows an exemplary control program which may be executed by the processor controller 811 for controlling various components of the system 800 to encode BCA data on a disk in accordance with the present invention.

As shown in Fig. 9, at step 901, the pick up arm 806, under the control of the controller 811, will first load a disk 805 onto the turn table 807. At step 903, a first individualizable code such as a serial number is selected by the process controller 811. At step 905, the disk is then encoded with this selected code in a preselected position and in a preselected layer on the disk 805. The controller 811 will

cause the beam forming system to focus the laser source 801 on the selected layer of disk incorporating the BCA. For example, the BCA may be located in layer 1 of a dual-layer disk, as specified in the DVD Specifications. As the BCA data is being written by the laser 801, the controller 811 generates the necessary signals to control the rotary signal processor 810 which then rotates motor 809 appropriately.

After finishing the encoding of the first BCA with the first code, the controller 811 will then instruct the pick up arm 806 to flip the disk over to the other side, at step 915. The controller 811 will then retrieve a second individualized code for use in the BCA for this side of the disk, at step 920. At step 925, controller 811 will then position the disk and/or the laser beam so that the second individualizable code will be cut in a preselected position on the this side of the disk. This preselected position may be overlapping as shown, for example, in Fig. 4, or non-overlapping as shown, for example, in Figs. 5-7, with respect to the BCA for the other side of the disk. Encoding of the BCA for this side of the disk in a non-overlapping manner may be accomplished by either moving the motor 809 so that the laser source 801 is hitting the disk at a different rotational angle in relation to the first BCA on the other side of the disk, as shown, for example, in Fig. 5; or moving the focus lens 804 to a different radius from the center of the disk as shown, for example, in Fig. 6. Therefore, either overlapping or non-overlapping BCAs may be etched on the same disk in accordance with the present invention.

Fig. 10 is an exemplary laser disk player 1000 which may be employed to play and process a dual-sided disk having a burst cutting area on each side of the disk, or a multi-layered disk having a burst cutting area on selective layer of the disk, in accordance with the present invention. The exemplary laser disk player 1000 consists of the following major components.

Disk Reader Mechanism 1110 consists of a motor 1111 which spins a disk 1112, a laser source 1113 which reads information from the disk 1112, and an arm/side changer 1114 for flipping a disk so that the other side of a dual-sided disk can be read. As discussed above, other possible ways of having a player being able to read the other side of a disk include mechanically moving the laser source 1113 to the other side of the disk or manually flipping the disk by a user. The laser source 1113 is typically a red light laser diode with wavelength at 635 or 650 nm.

The DVD-DSP (Digital Signal Processor) 1120 is a circuit that translates laser reflections from a disk being read into electrical form so that other parts of the player 1000 can process the electrical information. The DVD-DSP 1120 also contains the necessary circuitries to monitor and control the subelements of the Disk Reader Mechanism 1110, including controlling the laser 1113, and the motor 1111, etc.

The electrical information from the DVD-DSP 1120 is transmitted to a Digital Audio/Video Decoder section 1130. The Digital Audio/Video Decoder 1130 is a circuit which reconstruct the compressed data on the disk and converting them into studio-quality video and CD-quality audio for output to TVs and stereo systems.

In more detail, the Decoder 1130 consists of a Demultiplexer 1131 for demultiplexing the compressed data from the disk into three different data streams. A first data stream is a demuxed MPEG video stream which is transmitted to a MPEG Video Decoder 1132. A second data stream, a demuxed audio data stream, is fed into an appropriate type of audio decoder 1133 (such as a Dolby AC3 or an MPEG audio

decoder). The third data stream is a demuxed subpicture data stream which is fed into the Subpicture Processing circuit 1134 and OSD Generator circuit 1135 for processing subpictures such as subtitles, captions, menus, etc., and for generating OSD and user menuing information.

The decoded and processed MPEG video and subpicture/OSD video data streams are then muxed together by Mutiplexer 1136. The combined video information is transmitted to an NTSC/PAL encoder 1140 so that the digital video information is converted into NTSC or PAL compatible analog format for displaying on an analog NTSC or PAL television (not shown).

A Microcontroller 1150 is provided to control the operation of the player 1000, including translating user inputs from a remote control (not shown) or a front panel (not shown) into commands for the various elements of the disk player 1000. The Microcontroller 1150 is also responsible for implementing functions such as controlling parental lockout, reading data from a respective laser-encoded area, and dialing a program provider for validating access codes, etc.

Communication Control 1160 is responsive to the Microcontroller 1150 for communicating information to/from a program provider, for example, for transmitting a serial number read from a BCA to a program provider for validation or billing purposes. The Communication Control 1160 typically includes a modem for communicating to the service provider through the telephone network 1170 via direct dialing or through an internet ISP provider.

Fig. 11 shows an exemplary subroutine for reading codes from a respective laser encoded area. This subroutine may be executed by

the microcontroller 1150 of the exemplary laser disk player 1000 to identify and process different BCAs located on the same disk in accordance with the present invention. At step 1910, the lead-in area of a disk in the player 1000 is read by laser source 1113 and the information contained in the lead-in area is then processed by microcontroller 1150. The lead-in area of a disk includes data regarding the physical configuration of the disk. The information in the lead-in area currently include data about the number of layers on a disk, the disk size, and whether the disk contains a BCA, etc. If the player 1000 determines that this disk contains more than one layer of tracks, the player may assume that this disk contains more than one BCAs (e.g., one for each layer), as shown at steps 1920 and 1940. In addition, another exemplary embodiment may be that data in the lead-in area of the disk may specifically indicate the number of BCAs on the disk being processed, so that a player in response to this information will look for more than one BCAs at predefined locations.

If this lead-in area indicates that there is only one BCA on this disk either directly or indirectly, as shown at step 1930, the DVD player 1000 will then proceed to read this BCA as defined, for example, in the current DVD Specifications. Once this BCA is read, the player 1000 will end this subroutine for reading the BCA code, at step 1995.

If the player 1000 determines that more than one BCAs are on this disk, it will first identify the number of BCAs on the disk. The player 1000 will then locate a first predefined BCA code and read the code contained in the first BCA, as shown at step 1950. For example, if the disk is in a format shown in Fig. 5, the DVD will first focus the laser source 1113 on layer 1 to read BCA data on layer 1. The DVD player 1000 will then store this BCA in memory as well as an indication of which program this BCA code is associated with (e.g., an

indication that this first BCA code is for the first layer of side A of the disk), as shown at step 1960. The DVD player will then attempt to locate a subsequent BCA and read code from the subsequent BCA, at step 1970. For example, the DVD player 1000 will then cause the laser source 1113 to focus the laser on layer 0 of side A of the disk. It will then store this subsequent BCA code for the program in layer 0 of side A of the disk, at step 1980. The player will then repeat the process until all the BCAs on the disk are processed and read, as shown at step 1990, including turning the disk over to read BCA data from the other side of the disk.

It is to be understood that the embodiments and variations shown and described herein are for illustration only and that various modifications may be implemented by those skilled in the art without departing from the scope and spirit of the invention.

CLAIMS

1. A recording medium having a first and a second side comprising:

respective program data on said first and said second sides of said medium; and

a first area on said first side and a second area on said second side of said medium, said areas having laser encoded data representing information identifying said respective program data.

2. The medium of claim 1 wherein said first area and said second area occupy non-overlapping positions with respect to each other.

3. The medium of claim 2 wherein said first area has substantially the same inner and outer circumferences but a different angular position from said second area.

4. The medium of claim 2 wherein said first and second areas are positioned as concentric rings with respect to each other.

5. The medium of claim 1 wherein said medium is a DVD disk.

6. A recording medium comprising:

a first and a second layers, each of said layers containing respective program data;

a first area on said first layer and a second area on said second layer, said areas having laser encoded data representing individualizable information.

7. The medium of claim 6 wherein said first area and said second area occupy non-overlapping positions with respect to each other.

8. The medium of claim 6 wherein said first area has substantially the same inner and outer circumferences but a different angular position from said second area.

9. The medium of claim 6 wherein said first and second areas are positioned as concentric rings with respect to each other.

10. The medium of claim 6 wherein said medium is a DVD disk.

11. The medium of claim 6 wherein said first and second layers are on the same side of said medium.

12. The medium of claim 10 wherein said first and second areas are Burst Cutting Areas of said DVD disk.

13. The medium of claim 5 wherein said first and second areas are Burst Cutting Areas of said DVD disk.

14. A DVD disk, comprising:

A first layer for storing a first program;

a second layer for storing a second program;

an area of said first layer for having laser encoded data for identifying said first program; and

an area of said second layer for having laser encoded data for identifying said second program.

15. An apparatus for laser encoding a first and a second selectively distinctive codes on a recording medium, comprising:

means for encoding said first code in a first preselected position and in a first preselected layer on said recording medium; and

means for encoding said second code in a second preselected position and in a second preselected layer of said recording medium.

16. The apparatus of claim 15, wherein said first layer and second layer are on opposite sides of said recording medium.

17. The apparatus of claim 16 wherein said apparatus further comprises means for turning said recording medium from one side to the other.

18. The apparatus of claim 15, wherein said first position does not overlap said second position.

19. A method for processing a disk having more than one laser encoded data for identifying more than one programs on said disk, comprising:

identifying a count representing the number of laser encoded areas on said disk;

obtaining a first laser encoded data by reading from a first laser encoded area on said disk; and

obtaining a subsequent laser encoded data by reading from a subsequent laser encoded area on said disk until the number of laser encoded areas read equals to said count.

20. The method of claim 19, wherein said laser encoding areas are Burst Cutting Areas for a DVD disk.

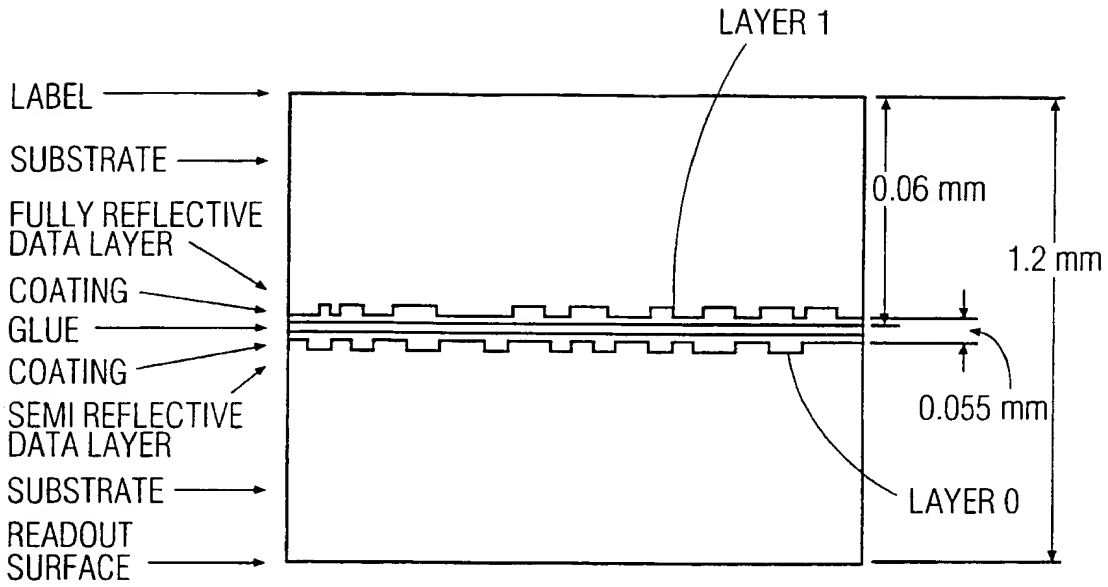

LAYER 1
LABEL
SUBSTRATE
FULLY REFLECTIVE DATA LAYER
COATING
GLUE
COATING
SEMI REFLECTIVE DATA LAYER
SUBSTRATE
READOUT SURFACE
0.06 mm
1.2 mm
0.055 mm
LAYER 0

FIG. 1A

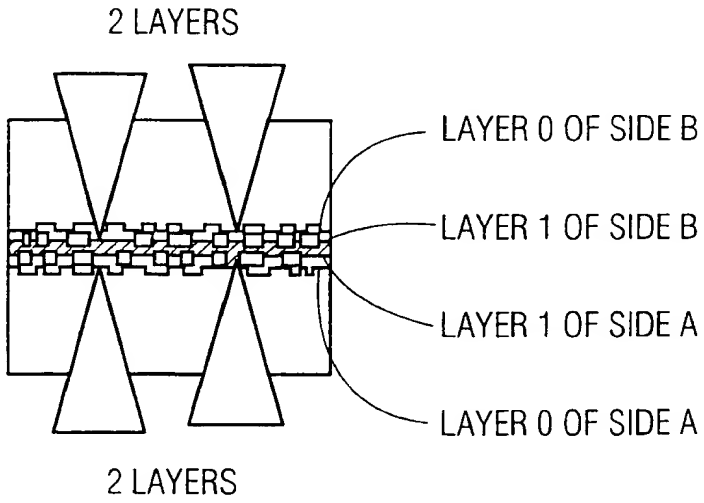

2 LAYERS
LAYER 0 OF SIDE B
LAYER 1 OF SIDE B
LAYER 1 OF SIDE A
LAYER 0 OF SIDE A
2 LAYERS

FIG. 1B

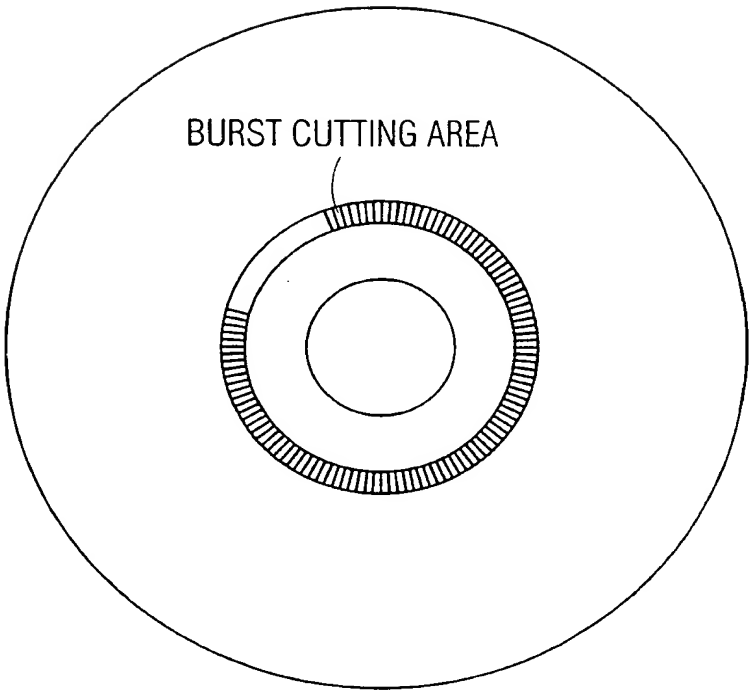


FIG. 2

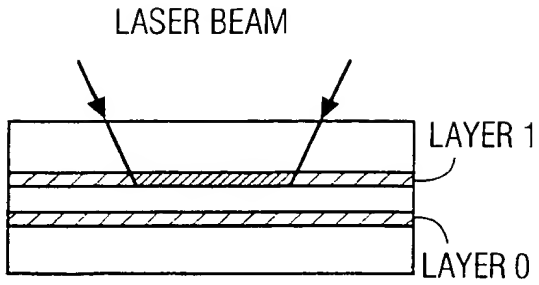


FIG. 3A1

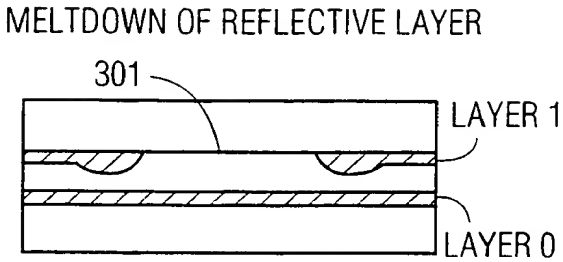


FIG. 3A2

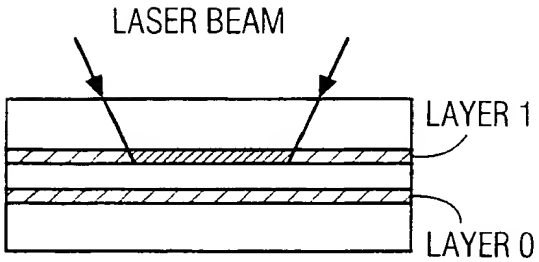


FIG. 3B1

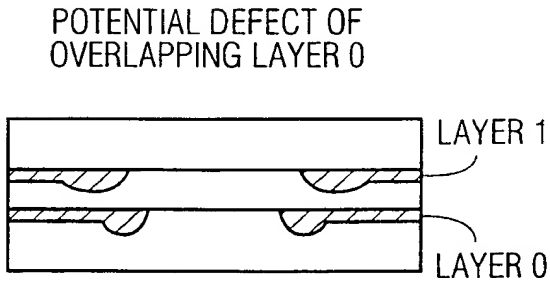


FIG. 3B2

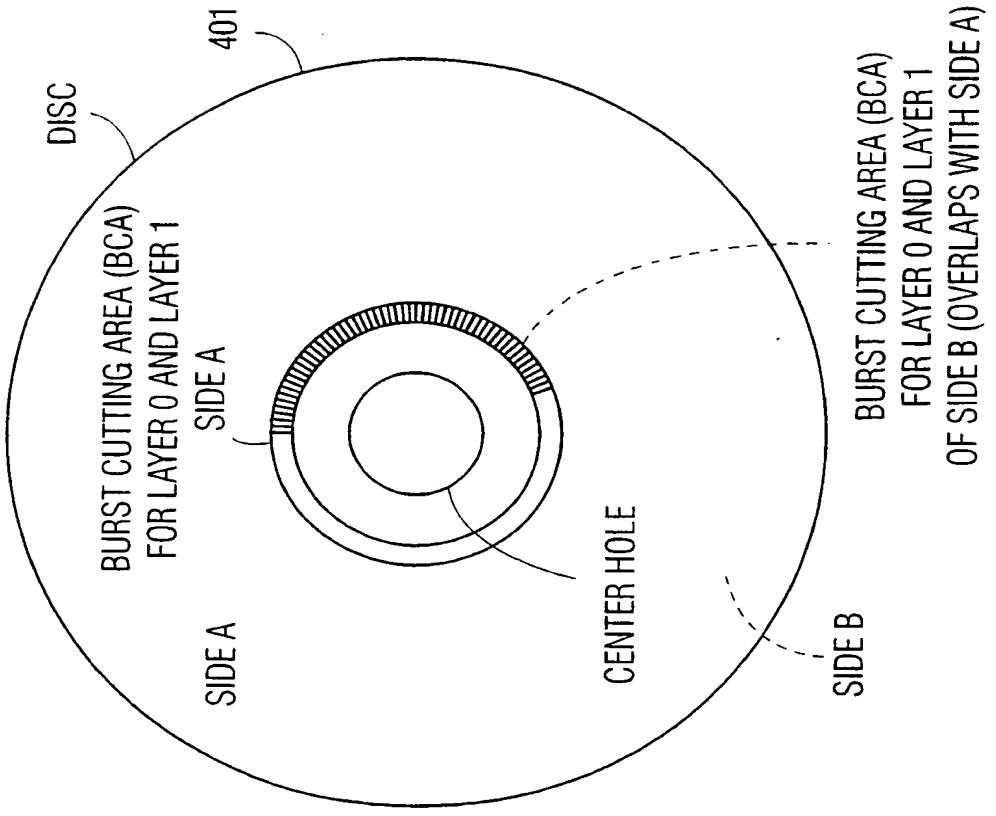

DISC
401
BURST CUTTING AREA (BCA)
FOR LAYER 0 AND LAYER 1
SIDE A
SIDE A
CENTER HOLE
SIDE B
BURST CUTTING AREA (BCA)
FOR LAYER 0 AND LAYER 1
OF SIDE B (OVERLAPS WITH SIDE A)

FIG. 4A

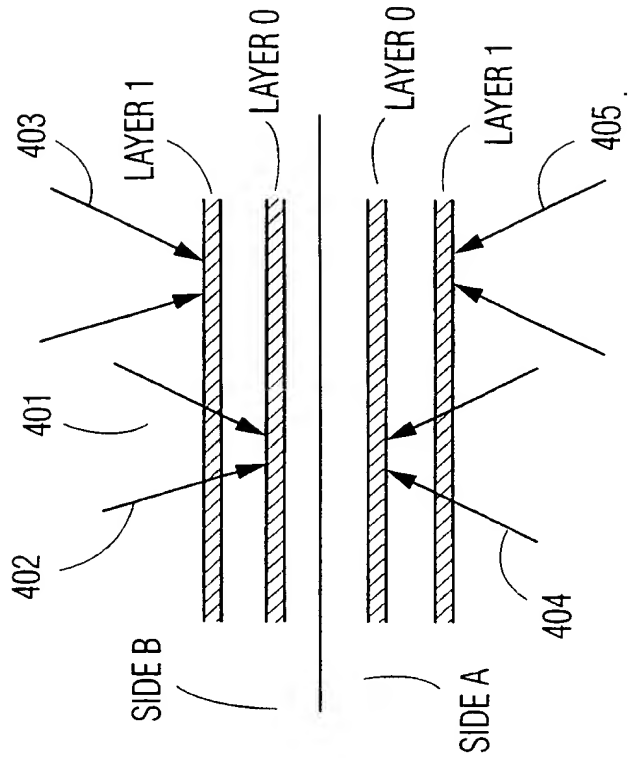

403
LAYER 1
LAYER 0
LAYER 0
LAYER 1
405
401
402
404
SIDE B
SIDE A

FIG. 4B

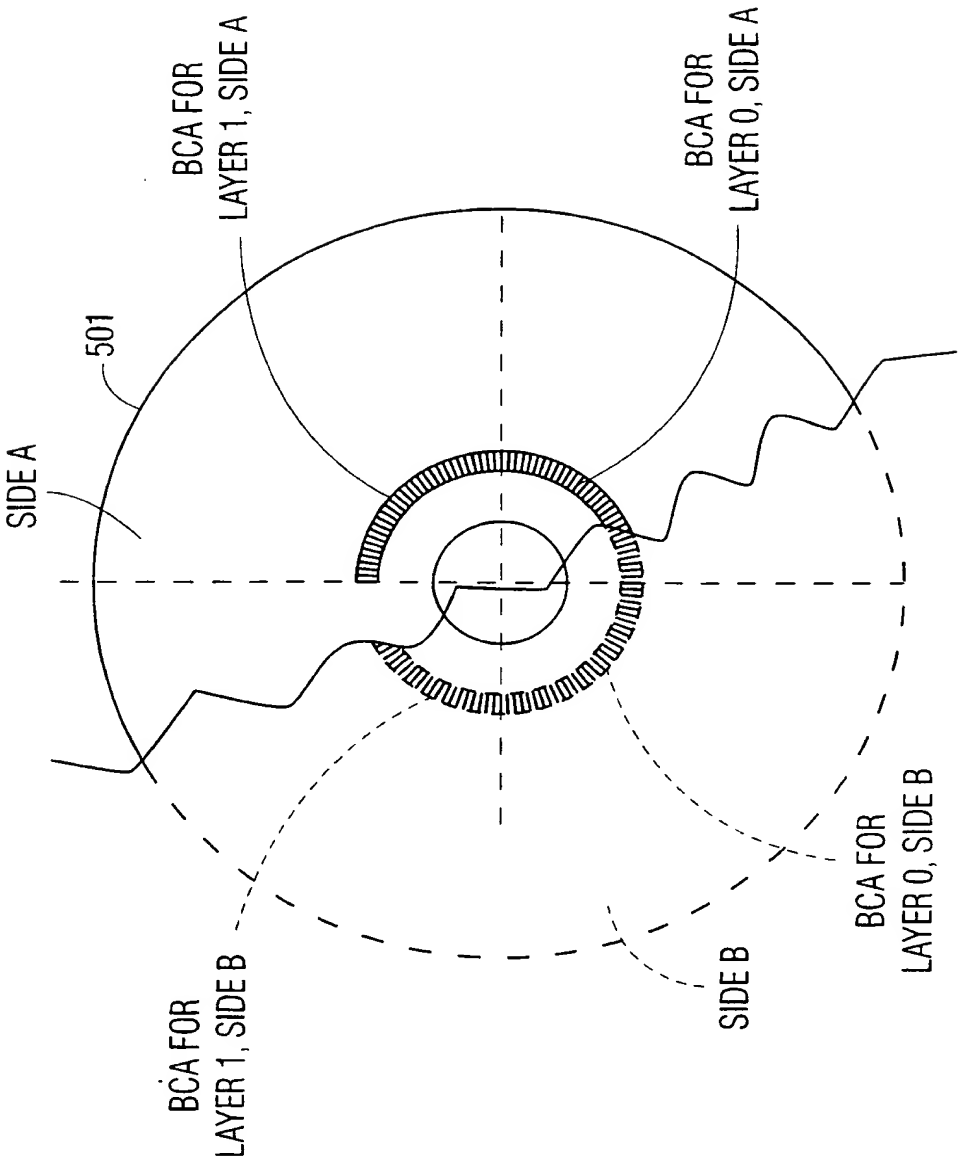

BCA FOR
LAYER 1, SIDE A
BCA FOR
LAYER 0, SIDE A
501
SIDE A
BCA FOR
LAYER 1, SIDE B
SIDE B
BCA FOR
LAYER 0, SIDE B

FIG. 5

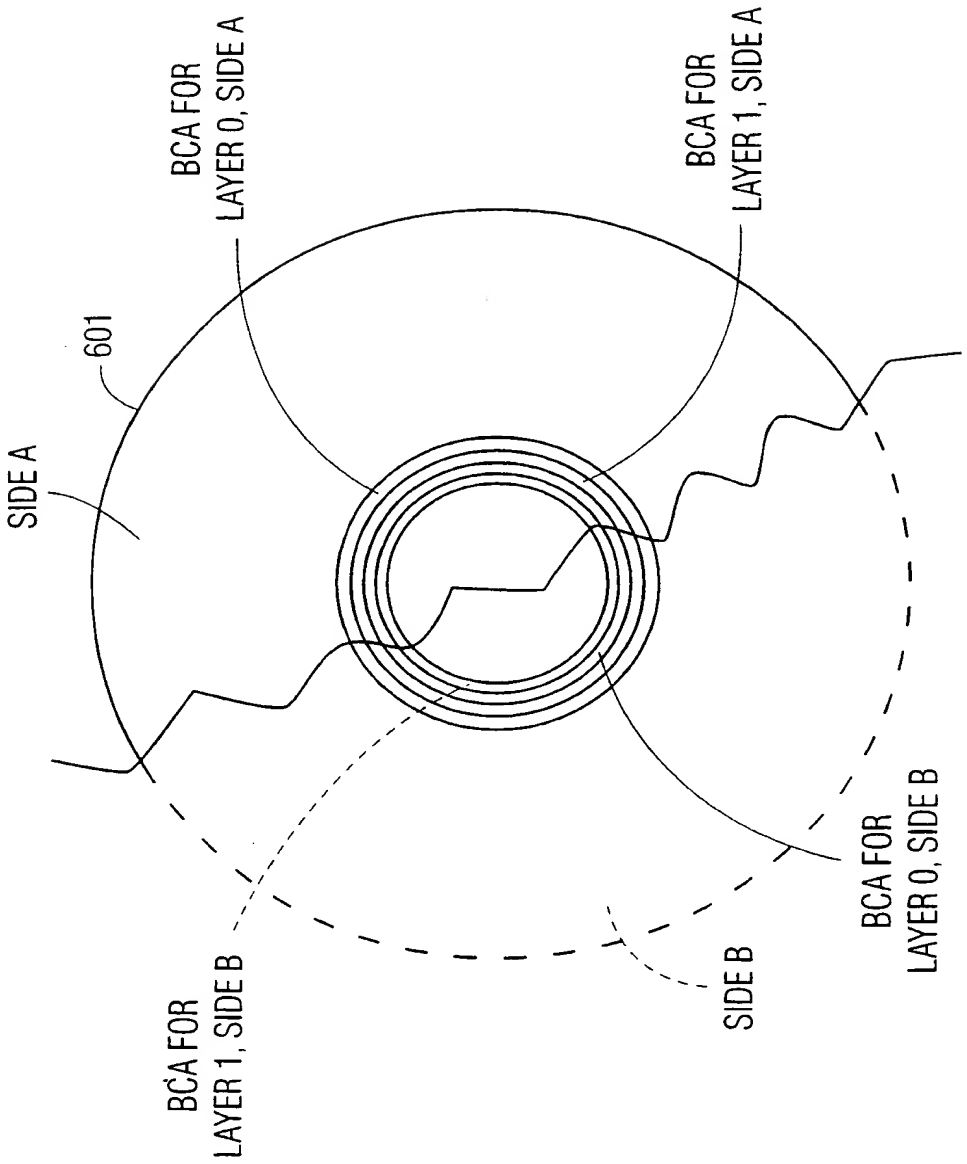

BCA FOR
LAYER 0, SIDE A
BCA FOR
LAYER 1, SIDE A
601
SIDE A
BCA FOR
LAYER 1, SIDE B
SIDE B
BCA FOR
LAYER 0, SIDE B

FIG. 6

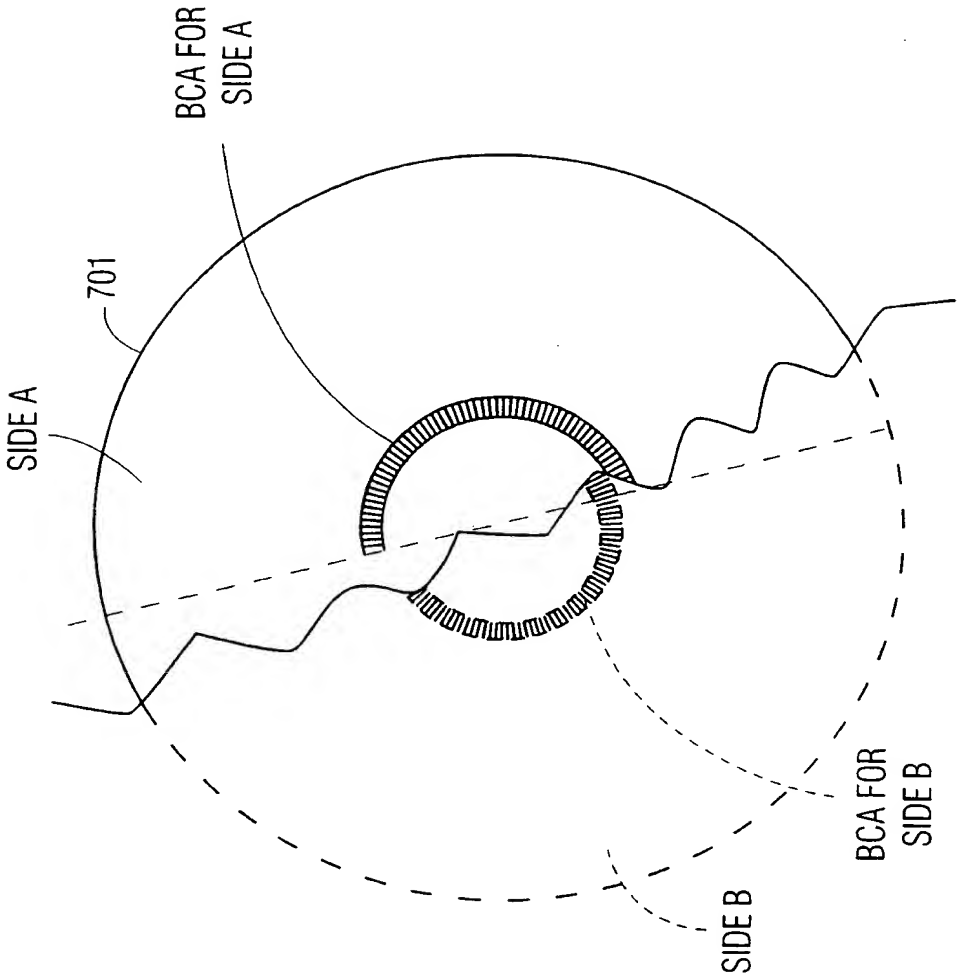
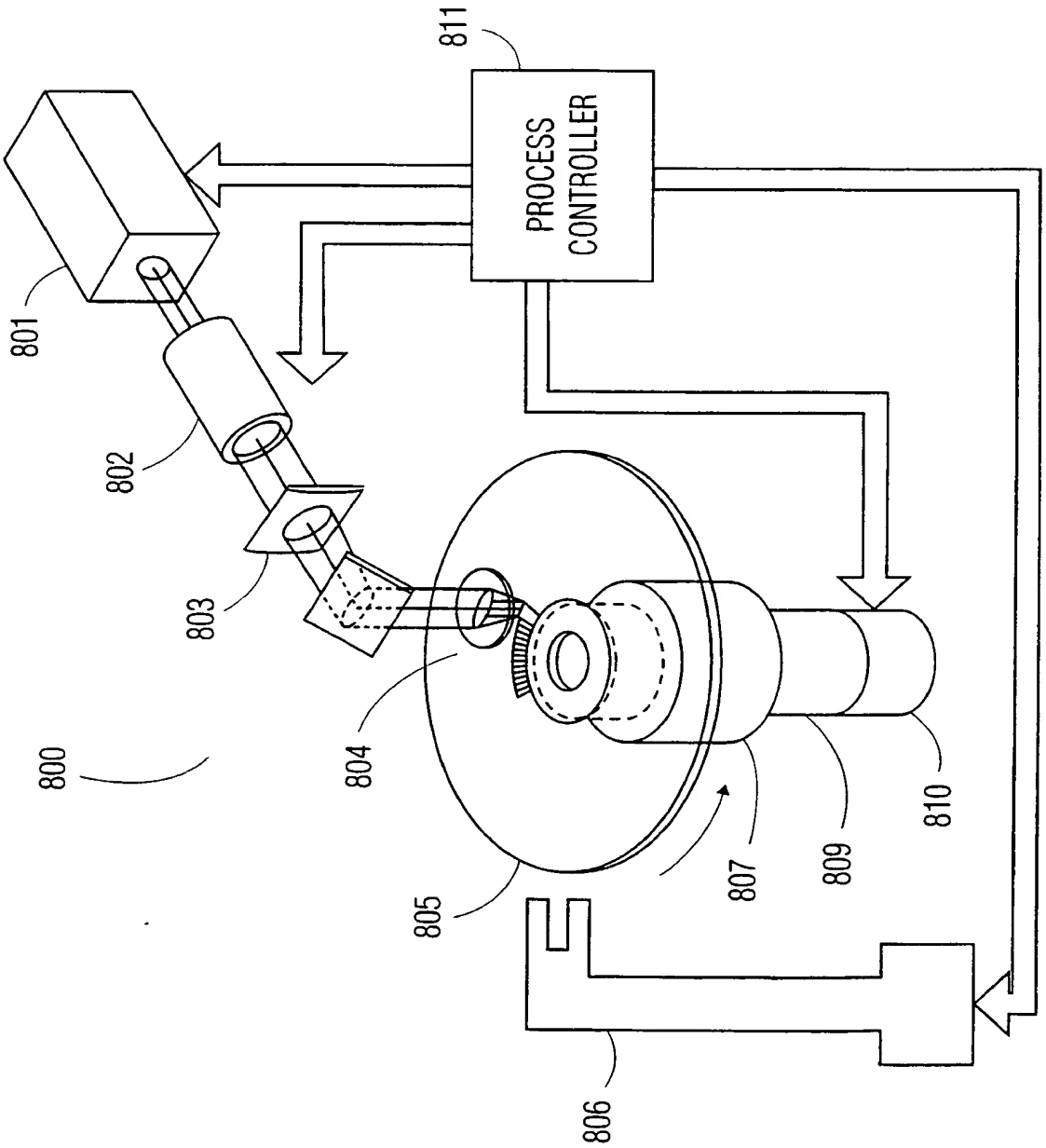


FIG. 7

FIG. 8


811
PROCESS CONTROLLER
801
802
803
804
800
805
806
807
809
810

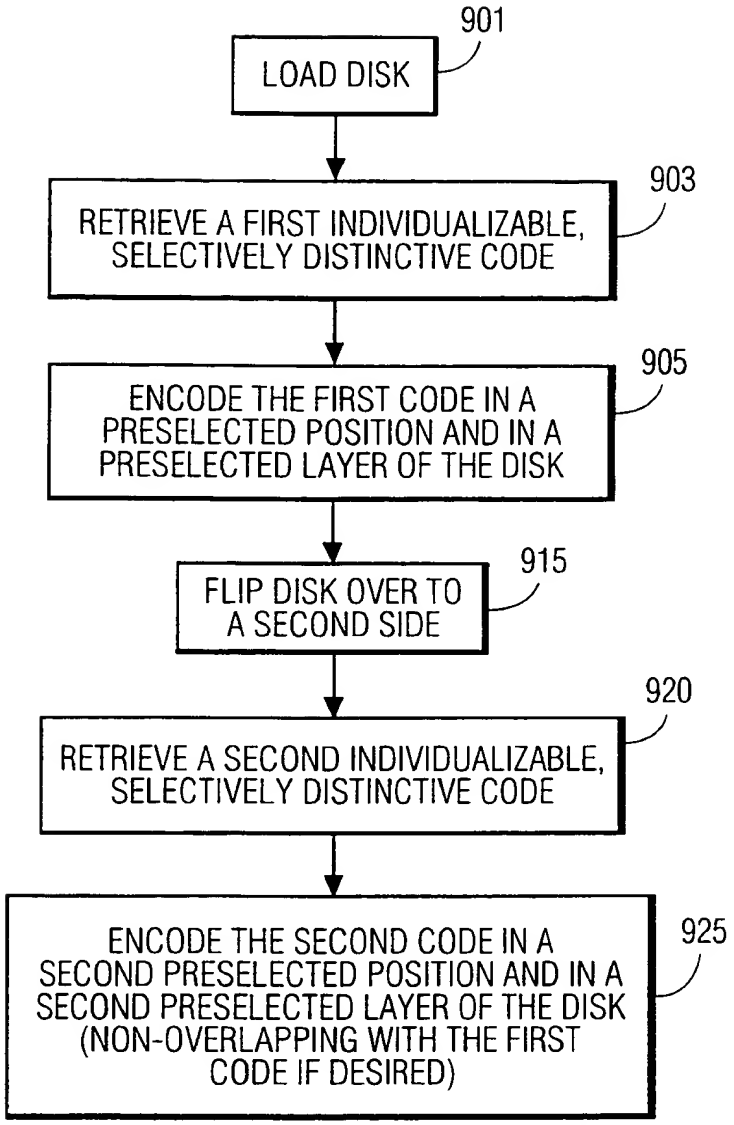

901
LOAD DISK
903
RETRIEVE A FIRST INDIVIDUALIZABLE, SELECTIVELY DISTINCTIVE CODE
905
ENCODE THE FIRST CODE IN A PRESELECTED POSITION AND IN A PRESELECTED LAYER OF THE DISK
915
FLIP DISK OVER TO A SECOND SIDE
920
RETRIEVE A SECOND INDIVIDUALIZABLE, SELECTIVELY DISTINCTIVE CODE
925
ENCODE THE SECOND CODE IN A SECOND PRESELECTED POSITION AND IN A SECOND PRESELECTED LAYER OF THE DISK (NON-OVERLAPPING WITH THE FIRST CODE IF DESIRED)

FIG. 9

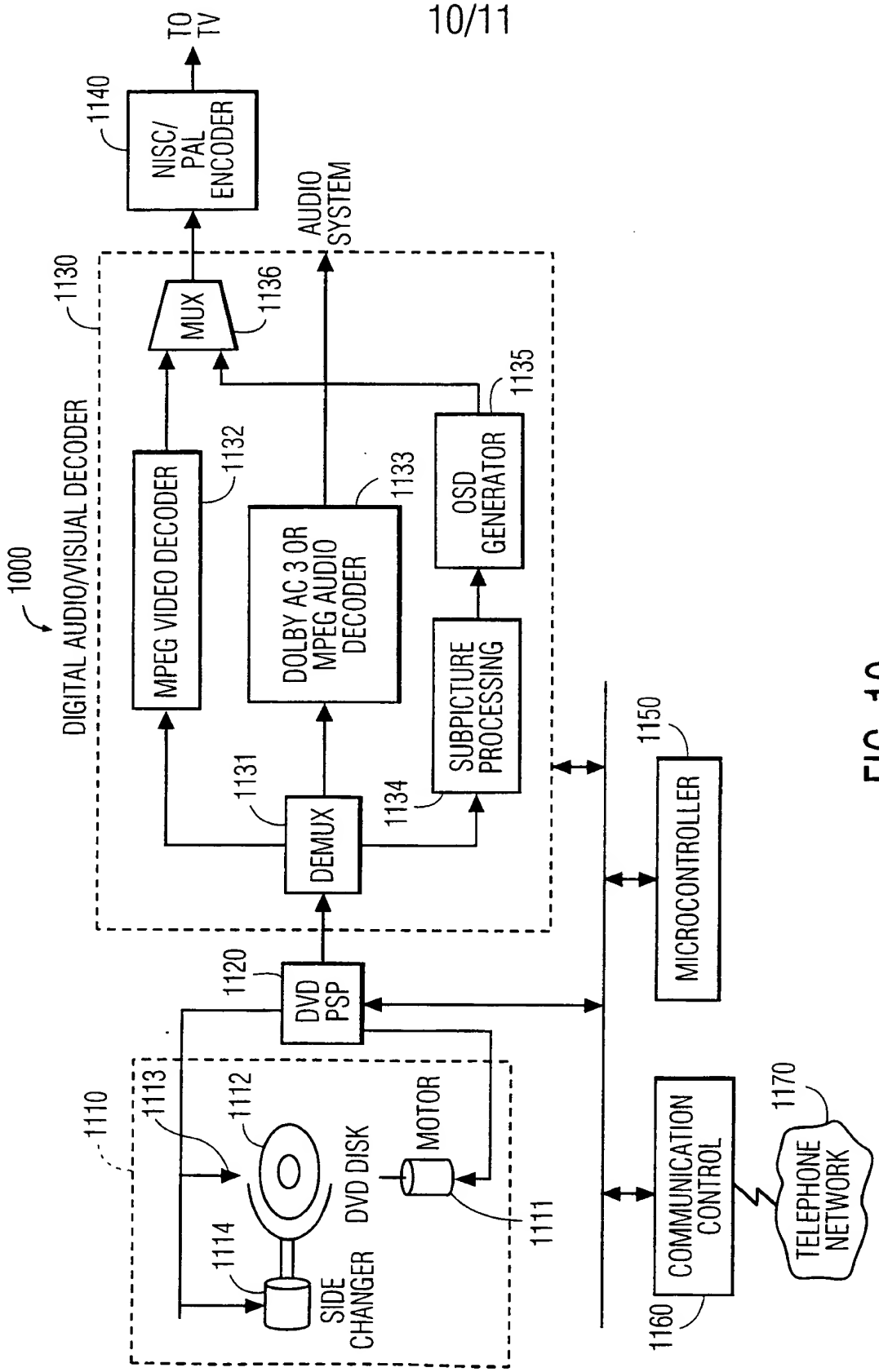

1000
DIGITAL AUDIO/VISUAL DECODER
1130
MPEG VIDEO DECODER
1132
DOLBY AC 3 OR MPEG AUDIO DECODER
1133
OSD GENERATOR
1135
SUBPICTURE PROCESSING
1134
DEMUX
1131
MUX
1136
AUDIO SYSTEM
NTSC/ PAL ENCODER
1140
TO TV
DVD PSP
1120
MICROCONTROLLER
1150
COMMUNICATION CONTROL
1160
TELEPHONE NETWORK
1170
1110
1113
1112
DVD DISK
MOTOR
1111
1114
SIDE CHANGER

FIG. 10

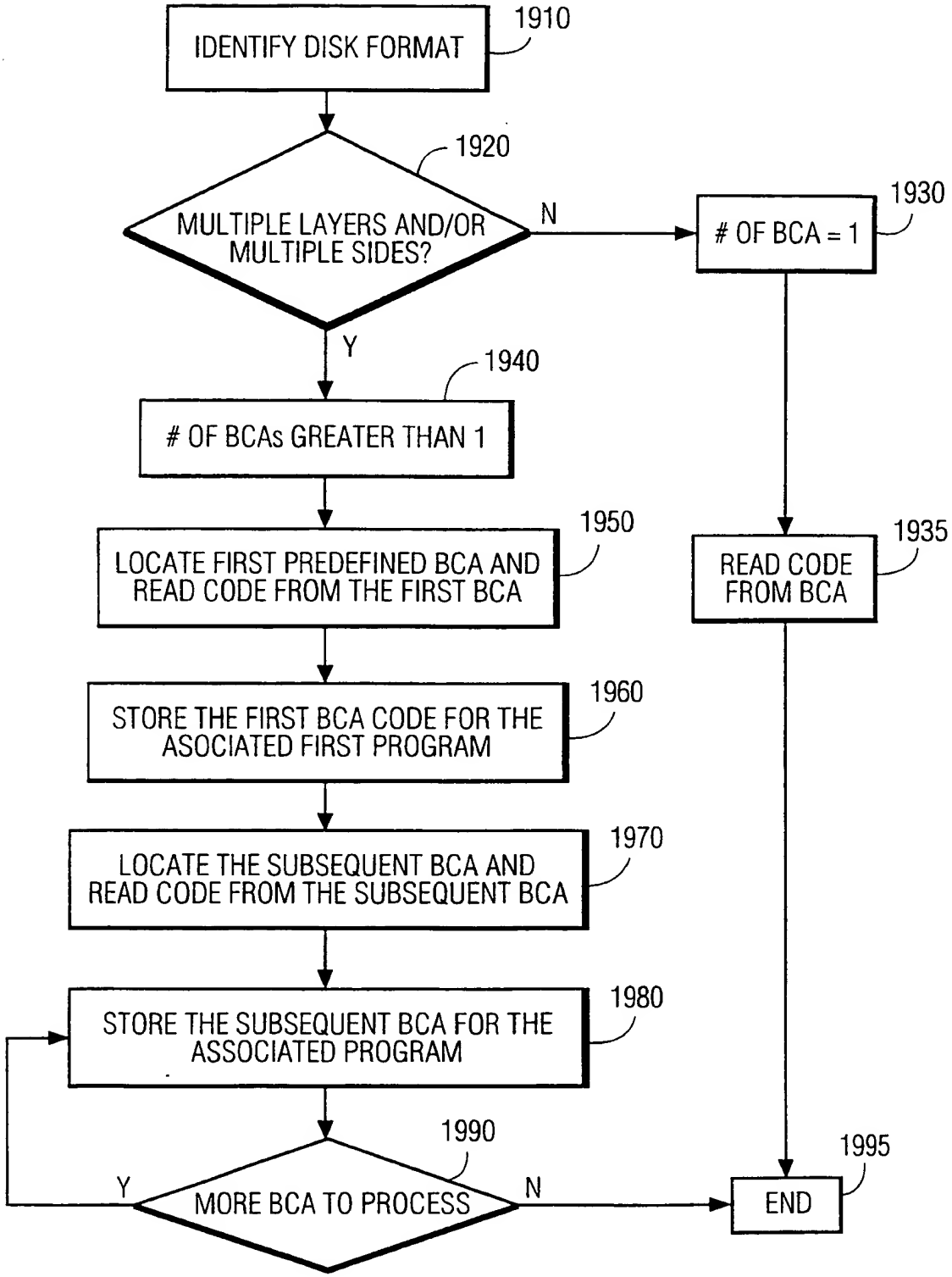

IDENTIFY DISK FORMAT
1910
MULTIPLE LAYERS AND/OR MULTIPLE SIDES?
1920
N
OF BCA = 1
1930
Y
OF BCAs GREATER THAN 1
1940
LOCATE FIRST PREDEFINED BCA AND READ CODE FROM THE FIRST BCA
1950
READ CODE FROM BCA
1935
STORE THE FIRST BCA CODE FOR THE ASOCIATED FIRST PROGRAM
1960
LOCATE THE SUBSEQUENT BCA AND READ CODE FROM THE SUBSEQUENT BCA
1970
STORE THE SUBSEQUENT BCA FOR THE ASSOCIATED PROGRAM
1980
MORE BCA TO PROCESS
1990
Y
N
END
1995

FIG. 11

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/US 98/12502

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G11B7/00 G11B7/007 G11B27/26

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G11B G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97 14144 A (MATSUSHITA ELECTRIC IND CO LTD ;OSHIMA MITSUAKI (JP); GOTOH YOSHIH) 17 April 1997	1,5,6, 10-15, 19,20
P,A	-& EP 0 802 527 A (MATSUSHITA ELECTRIC IND CO) 22 October 1997 cited for language reasons	

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 October 1998	14/10/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Holubov, C

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter nal Application No
PCT/US 98/12502

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9714144 A	17-04-1997	CN 1166223 A	26-11-1997
		CN 1173942 A	18-02-1998
		EP 0741382 A	06-11-1996
		EP 0807929 A	19-11-1997
		EP 0802527 A	22-10-1997
		WO 9616401 A	30-05-1996
		WO 9714146 A	17-04-1997
		US 5761301 A	02-06-1998
		JP 10233019 A	02-09-1998